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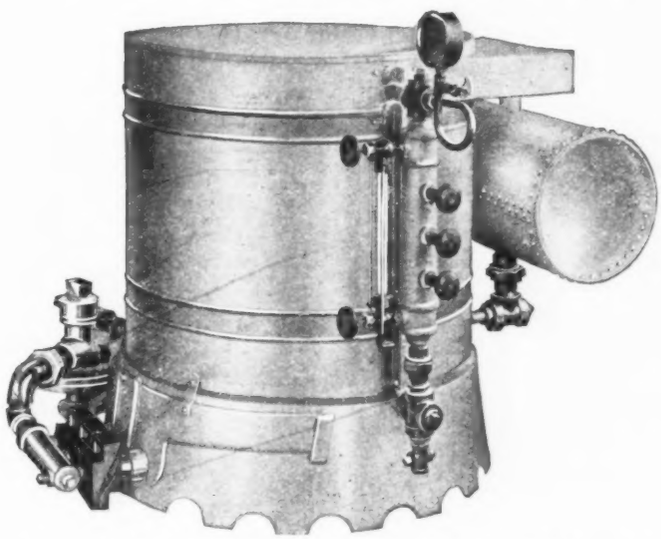

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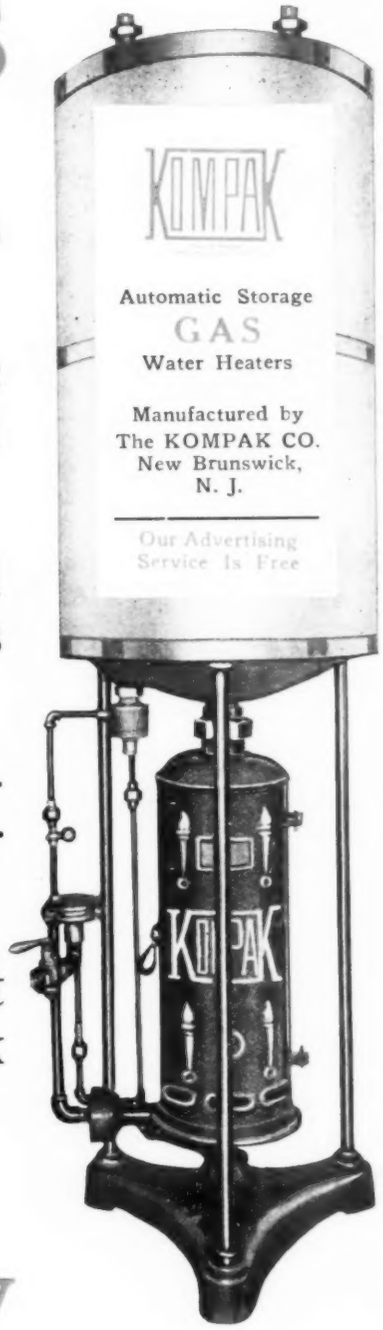

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Where Gas Enters in the Enamel Industry

Highly Fusible Gas the Basis of All Enamels—Fusing Period Durates for Hours—How Colorings Are Obtained

By GILBERT C. SHADWELL

It is doubtful if there is any more common object included under the head of metal ware, than an enameled product; still in spite of this fact and the field that is apparent from the use of heat in the manufacture of such goods, the writer does not recall any work having been written on this subject in the gas trade publications.

With this point in mind it is believed that a few details will be found of interest and although no definite style of equipment is recommended, yet gas men will doubtless be able to form their own conclusions as to what to employ from their own knowledge of local conditions coupled with the information which will be given relative to the process involved.

Enamels may be briefly described as being transparent or opaque substances, usually formed of glass which may be colored with metallic oxides and applied in a thin stratum to brightly polished or other suitable metallic surfaces by means of fusion brought about by the aid of heat, and in cooling form a sort of vitreous varnish.

Industry of Ancient Origin

The art of enameling acquired the greatest perfection in ancient times, especially on such metals as gold and copper. The enamels were fused on the flame of a lamp urged by a blow pipe or by the heat of a small furnace. Very beautiful specimens are still preserved which the moderns are unable to equal, and with the materials of which we are to-day apparently unacquainted. At the present day this pleasing and useful application of human industry is carried on with the greatest success by the Venetians and after them by the French, although more recently the work has been well cared for in England, and in the United States. The limits of this article will not permit a description of the various operations of enameling which essentially depend on skillful manipulation, a knowledge of which can only be obtained by long practice.

Glass the Basis of All Enamels

The basis of all enamels is a highly transparent and fusible glass which readily receives a color on the addition of metallic oxides. As this is required in the preparation of many of those that follow, it is placed first.

The base or flux for enamels is an important factor and a common one is made of the following:

Red lead, 16 parts; calcined borax, 3 parts; powdered flint glass, 12 parts; powdered flints, 4 parts. This is fused in a crucible for 12 hours. It is then poured into water and reduced to powder in a mortar. This is an old formula but used largely by jewelers and others to-day.

The following is a more recent formula, and as the work can be done in a small furnace with a cast iron pot, such as a sort metal furnace will be the more interesting to industrial men. They take of tin 2 to 5 parts; lead, 10 parts. This is calcined in an iron pot at a dull cherry red heat and the oxide is scraped off as it forms. It is important to observe that it be obtained quite free from indecomposed metal.

When enough of the brass is obtained, they reduce it to a fine powder by grinding and elutriation, then they mix 4 parts of this powder with an equal weight of pure sand or powdered flint and 1 part of sea salt or other alkaline matter. The mixture is then fused, usually in a crucible, and the procedure is as before. The best proportions of the tin and lead for all ordinary purposes are about 3 of the former to 10 of the latter. The calcined mixed oxides are commonly called "calcine."

An alternative is lead and tin in equal parts calcined as above. They then take of the mixed oxides or calcine and ground flints, of each 1 part as well as pure subcarbonate of potash 2 parts. The rest is as before.

Some makers adopt the following: Lead, 30 parts; tin, 33 parts. These are calcined and then mixed to the extent of 50 parts of the calcine with an equal weight of flints, in powder, and one pound of salts of tartar. This produces a fine dead white enamel when treated as above.

The precise quantities of the products of the above processes depend greatly upon the duration and degree of the heat employed. By increasing the quantity of sand, glass or flint the enamel is rendered more fusible and the opacity and whiteness is increased by the addition of oxide of tin. The use of borax has to be avoided or used only very sparingly as it is apt to make the enamel effloresce and lose color.

So far as the colors are concerned, these will be dealt with later. In the present we will touch on the more important matter of—

Enameling Iron Vessels

For enameling cast and wrought iron vessels, two compositions are in use; one has for its base silicate of lead. One of these enamels is applied to the scoured surface of the metal in the form of a powder, which is fixed by heating to a sufficiently high temperature to fuse; it is then spread over and covers the metal with a vitreous varnish. The boro-silicate of soda possesses great superiority over the silicate of lead, for it is not attacked by vinegar, salt, or the greater number of jams, jellies, or acid, or saline solutions even when concentrated, and resists the action of agents used in cooking or chemical operations. The silicate of lead enamel is whiter and more homogeneous, which explains the preference which used to be given to it by the public, but it gives up oxide of lead to vinegar or to common salt; it acts upon a great number of coloring matters and it is attacked by nitric acid which communicates a dull color to it. On evaporation the liquid leaves a white crystalline residue of nitrate of lead. This enamel is instantly darkened by dissolved sulphides and also by cooking food containing sulphur, such as cabbage, fish and eggs.

To color the enamel green they mix with it before heating 1 to 2 parts of oxide of chromium to 10 parts enamel.

For blue they use prepared cobalt, red lead and niter, or antimony, equal parts of each by weight. For yellow they use lead and tin ashes, litharge and each in equal parts by weight and 4 parts by weight of niter.

Gold and purple of Cassius are used for red and purple. For black they employ calcined iron and cobalt, of each 1 oz., or zaffre, 2 oz.; manganese, 1 oz.

Before proceeding to describe the process of enameling on cast iron, hollow ware, etc., we will return to the matter of coloring materials to be added to the fluxes previously spoken of. So many of these require heat for these formations that a description becomes doubly interesting.

A fine black is made from pure clay, 3 parts, and protoxide of iron, 1 part. These are thoroughly mixed together and fused in a furnace. The fusing can be carried out in a furnace, such as is used for case hardening and similar work (see Fig. 2), but it is quite usual to employ a crucible furnace for the ordinary fusion work.

Another type of black is made with the flux we have spoken of by taking any given weight and mixing it (the white flux) with an equal weight of the following mixture: Calcined iron (protoxide), 12 parts; oxide of cobalt, 1 part. Or as an alternative: Peroxide of manganese, 3 parts, and zaffre, 1 part. These are mixed together and white flux as required added.

We will now list the different colors in order as follows:

Blue—Either of the fluxes first mentioned can be colored blue with oxide of cobalts; or otherwise, sand, red lead and niter, of each 10 parts; flint glass or ground flints, 20 parts; oxide of colbalt, 1 part, more or less, the quantity wholly depending on the depth of color required.

Brown—Manganese, 5 parts; red lead, 16 parts; flint powder, 8 parts, and then mix as before. Another form of brown is made of manganese, 9 parts; red lead, 34 parts; flint powder, 16 parts.

Green—Flux, 2 lb.; black oxide of copper, 1 oz.; red oxide of iron ½ dram; mixed together as before. Or, it may be mixed as above, except that red oxide of copper is substituted for the black, but it is less decisive. Again, copper dust and litharge (of each 2 oz.), niter, 1 oz.; sand, 4 oz., and as much flux as required, can also be used for a green.

Also, by adding oxide of chromium to a sufficient quantity of flux it can be made to produce a variety of shades. Moreover, when well managed the color is superb and will stand a very great heat, but in inexperienced hands it frequently takes on the dead-leaf tinge.

The reader will find a series of comparative temperatures given later which will have a distinct bearing on these data.

Another green sometimes used is made from transparent flux.

Enameled Cast Iron

In enameling cast iron they usually clean and brighten the iron before making an application of enamel. The cleaning is usually a simple matter, and need not here be gone into, although heat is often a necessity. The enamel consists of two coats, the body and the glaze. The body is made by fusing 100 lb. of ground flints, 75 lb. of borax, and grinding 40 lb. of this frit with 5 lb. of potter's clay in water until it is brought to the consistency of a pap. A coat of this is applied and dried, although it must not be dried hard. The glaze powder is then sifted over it. This consists of 100 lb. Cornish stone in fine powder, 117 lb. of borax, 35 lb. of soda ash, 35 lb. of niter, 35 lb. of sifted slaked lime, 13 lb. of white sand and 50 lb. of powdered white glass. These are all fused together, the flux obtained being pulverized. Of this powder, 45 lb. are mixed with 1 lb. of soda ash in hot water and the mixture dried in a suitable oven (similar to a cove oven). This is the glace powder. After sifting this over the body coat the cast iron articles are loaded into another similar oven, kept at a temperature of about 212 deg. Fahr. which will dry it hard. After this it is set into a muffle kiln to fuse it into a glaze. The inside of pipes may be enameled (after being cleaned) by pouring the above body composition through them while the pipe is being turned around to insure an even coating. After the body has become set, the glaze pap is poured in in the same manner. The pipe is then fired in the kiln or in a furnace of special construction.

Porcelain Enamel for Iron

A porcelain enamel for iron consists of the following: Flint (quartz) calcined and ground, 100 lb.; borax glass (anhydrous borax) ground, 50 lb. These are mixed,

fused together in a crucible or other suitable furnace and it is allowed to cool slowly. This is then powdered and they mix 40 lb. of this glass with 5 lb. of kaolin (white potter's clay) and grind the mixture to a fine paste in water; they pickle the vessels in diluted sulphuric acid and scour with sand to thoroughly cleanse its surface; then they line it with a coating of the above paste about one-sixth of an inch thick, and then set the articles in a drying room until the coating has partially dried. After this they dust over the surface of the paste coating (still moist) the following powder and it is then dried in an oven as already referred to, the temperature being in this case about 250 deg. Fahr., although a lower temperature will suffice: White glass, free from lead or arsenic, 125 lb.; borax, 25 lb. Carbonate of soda fused, powdered, moistened with water and dried, 20 lb. To 45 lb. of this they add 1 lb. soda. It is then mixed thoroughly with a little hot water, dried and reduced to a fine powder. When the coating on the iron has dried the vessel is put in a muffle furnace and the heat is gradually increased until the glaze fuses, when it is taken out, more glaze powder is dusted on and after a second heating allowed to cool very slowly. Much of the heating is still done with oil, coal, coke and other fuels, but gas can be substituted very readily, and this is a profitable field.

Some of the glazes employed consist of friable mixtures of feldspar, sodium, carbonate, borax and oxide of tin. Feldspar is also sometimes added to the enamel body.

To enamel hollow ware, including cast iron articles of small and medium size, the following are some of the formulæ employed: Calcined flints, 6 parts; Cornish stone or composition, 2 parts; litharge, 9 parts; borax, 6 parts; argillaceous earth, 1 part; niter, 1 part; calx of tin, 6 parts; purified potash, 1 part. An alternative is: Potter's composition, 12 parts; borax, 8 parts; white lead, 10 parts; niter, 2 parts; white marble calcined, 1 part; purified potash, 2 parts; calx of tin, 5 parts; Another alternative is: Calcined flints, 8 parts; red lead, 8 parts; borax, 6 parts; calx of tin, 5 parts; niter, 1 part. The last and most interesting from the gas man's viewpoint is: Calcined flints, 4 parts; potter's composition, 1 part; niter, 2 parts; borax, 8 parts; white marble calcined, 1 part; argillaceous earth, ½ part; calx of tin, 2 parts. The above compositions have to be finely powdered, mixed and fused. The vitreous mass is to be ground when cold, sifted and levigated with water. It is then made into pap with water or gum water. This pap is brushed over the interior of the articles, dried and fused with a proper heat in a muffle furnace. The vessels, of course, have to be thoroughly cleaned before applying.

Miscellaneous Enamels

Gas men will naturally not confuse the real enamels with other enamels so called, which are often in the nature of a japan, and, of course, that series is outside the scope of this article. Nevertheless, a word or two on semi-enamels, as they are usually termed, may not be out of place at this point in order that no misunderstanding may occur.

The black "enamel" used on cycles, etc., for instance, is made in a manner such as the following: Asphalt, 40 oz.; boiled linseed oil, ½ gal.; litharge, 1 oz.; powdered zinc, sulphate, 4 oz.; red lead, 6 oz.; litharge, 6 oz. The asphalt is melted in an appliance such as a small cauldron furnace and the others are then added. They then boil for 2 hours, and stir in 8 oz. of fused dark amber gum and 1 pint hot linseed oil. It is then boiled for 2 hours more. When the mass has thickened the old practice was to remove the kettle from the fire and add 1 gal. of turpentine, but when using a gas heated kettle the mass can merely be drained out. There is then no danger of fire and the paps can be safely poured in and stirred together.

There is a so-called enamel sometimes used for what is termed enameling on card. The glaze upon such enameled cards is made by pressure upon a polished plate or rollers. The actual composition is chalk, clay and a little starch. Good work requires elaborate accessories, but as only mention is desired to be made of the matter, this will not be entered into at this time.

Similarly the enameling of cardboard is another case where the use of the word enamel is liable to be misleading. Cardboard is treated with a surface of white lead and size laid on by a round badger's hair brush. A powder of talc (which is siliciate of magnesia) is rubbed upon the dried surface of the lead and the face is then polished by the brush. The writer has an idea that the cardboard is sometimes warmed between gas or steam-heated steel rollers, but, here again, as this is outside the scope of this article it will not be considered further at this time.

There is, however, a distinctly interesting enamel used for labels and which is of the vitreous type and properly belongs in this discussion. It is made of the following: Arsenic, 24 parts by weight; saltpeter, 24 parts; silica (fine sand), 72 parts; litharge, 200 parts. This mixture is spread on plates of glass which are not inferior in point of fusibility to the enamel. Glass thus prepared may be drawn or written on as readily as if it were paper, and the writing may be rendered indelible by heating the plate in a small open furnace (oven or utility gas furnace) or in a gas fired muffle furnace.

Labels are made in this way to quite an extent for horticultural purposes, as well as for signboards, showcards, signs, etc. Above all the process is cheap and the results are so good that photographs may be readily reproduced in this enamel when sensitized.

Further Enamel Colors and Fluxes

In the first part of this article we entered into a discussion of the mixture of art fluxes with colors. Ordinarily it would scarcely be necessary to include more than a few colors, but as each requires a different treatment, the writer considers it highly desirable to include at least a list of the ones more commonly met with in order that the industrial man may regulate his temperatures, etc., accordingly. The writer will, therefore, treat on the following list in addition to those named previously: Olive, orange, purple, red, rose-colored, transparent, violet, yellow, and white. For convenience they will be presented in the following forms:

OLIVE—

Material: Good blue enamel, 2 parts; black enamel, 1 part; orange enamel, 1 part.

Remarks: Mix together.

ORANGE NO. 1—

Material: Red lead, 12 parts; red sulphate of iron, 1

part; oxide of antimony, 1 part; flint powder, 3 parts; (see above), 50 parts.

Remarks: To be calcined, powdered and melted with the flux by heating as explained in first section of this article.

ORANGE NO. 2—

Material: Red lead, 12 parts; oxide of antimony, 4 parts; flint powder, 3 parts; red sulphate of iron, 1 part; flint (see remarks).

Remarks: To be calcined; then add flux, 5 parts to every 2 parts of mixture in above paragraph.

PURPLE NO. 1—

Material: Flux colored with oxide of gold, purple precipitate of cassius, or peroxide of manganese, as required.

Remarks: Treated as before.

PURPLE NO. 2—

Material: Sulphur, 1 lb.; niter, 1 lb.; vitriol, 1 lb.; antimony, 1 lb.; oxide of tin, 1 lb.; red lead, 60 lb.

Remarks: Mix and fuse, cool and powder as mentioned in the text in first part of this article. Then add:

Material: Rose copper, 19 oz.; zaffre, 1 oz.; crocus martis, 1½ oz.; borax, 3 oz.; gold, silver, mercury amalgam, 1 lb.

Remarks: Fuse, stirring the melted mass with a copper rod all the time. Then place in crucible and put in a reverberatory furnace for twenty-four hours.

(Note—This is used by large manufacturing jewelers doing enamel work, as well as by those carrying out other art work of a similar nature. A china kiln or muffle furnace can also be substituted. This is said to be the purple enamel used in the mosaic pictures of St. Peter's at Rome, Italy.)

RED NO. 1—

Material: Sulphate of iron (calcined dark), 1 part; mixture of 6 parts of flux, previously given, and 1 part of colcothar, 3 parts. (The flux mentioned is the one consisting of red lead, 18 parts; borax (not calcined), 11 parts, and flint glass, 16 parts. See earlier section of this article.)

Remarks: This gives a dark red.

RED NO. 2—

Material: Red sulphate of iron, 2 parts; this (first on list in early part of article), 6 parts; white lead, 3 parts.

Remarks: This gives a light red.

RED NO. 3—

Material: Paste or flux colored with the red or protoside of copper, as required.

(Note—Should the color pass into the green or brown from partial peroxidizement of the copper from the heat being carried too high, the red color may be restored by the addition of any carbonaceous matter as tallow or charcoal. It is very desirable, however, to keep a reducing flame and not to use an atmospheric burner for the work. A thermostatic control is not a necessity but is a helpful adjunct.)

RED NO 4—

(Note—The most beautiful and costly red, inclining to the purple tinge, is produced by tingeing glass or flux with the oxide or salts of gold, or with the purple precipitate of cassius, which consists of gold and tin. In the hands of the skillful artist any of these substances produce shades of red of the most exquisite hue When most perfect the enamel comes off from the furnace quite colorless, and afterwards receives its rich hue from a blowtorch or other suitable blast burner.)

ROSE-COLORED—

Material: Purple enamel or elements, 3 parts; flux, 90 parts.

Remarks: Mix and add silver leaf or oxide of silver, 1 part or less.

TRANSPARENT—

Material: Any of the fluxes above referred to except the last three, as required.

Remarks: See note below.

(Note—This is similar to what is called "paste." Paste in ceramics is a term applied to clay either by itself or mixed with other materials.)

Violet—Saline or alcaline frits, or fluxes colored with small quantities of peroxide of manganese. As the color deepens on the metal being at the maximum of oxidation contact with all substances that would abstract any of its oxygen should be avoided. The same remarks apply to other metallic oxide.

YELLOW NO. 1—

Material: Red lead, 8 oz.; oxide of antimony, 8 oz., and tin, 1 oz., calcined together.

Remarks: Mix and add the fourth flux referred to earlier, 15 oz.; then mix and fuse.

(Note—By varying the proportions of the ingredients various shades may be produced.)

YELLOW NO. 2—

Material: Lead, 1 oz.; tin ashes, 1 oz.; litharge, 1 oz.; antimony, 1 oz.; sand, 1 oz.; niter, 4 oz.

Remarks: Mix, fuse and powder; add the product to any quantity of flux, according to color required.

YELLOW NO. 3—

Material: White oxide of antimony, 1 part; alum, 1 part; sal ammoniac, 1 part; pure carbonate of lead, 1 to 3 parts (all in powder as required).

Remarks: Mix and expose to a head sufficiently high to decompose the sal ammoniac color. Color is very bright.

YELLOW NO. 4—

Material: Flux, as required, fused with oxide of lead, as required; a little red oxide of iron.

Remarks: Shades vary with proportions used.

YELLOW NO. 5—

Material: Pure oxide of silver, as required; any metallic flux, as required.

(*Continued on page* 31.)

Sees the End of Use of Oil in Gas Making

J. C. Dickerman, Engineer, State Corporation Commission of Virginia, Would Not, However, Discard Water Gas Sets—Would Lower B.t.u. Standards and Confine Gas Company's Products to Gas and Tar

The gas industry has so far experienced in several ways two distinct epochs, declared Judson C. Dickerman, engineer, State Corporation Commission of Virginia, in a paper before the recent convention of the Southern Gas Association. The stages concerned with public relations have been, first, that of little or no governments or public control, except as evidenced by the bargaining preliminary to granting franchises, which it is fair to say as a general rule, left the industry practically free of control, and secondly, and recently, definite public control in all important particulars affecting price and service. Modern, effective public control is really only a few years old. The public has had to go to school to learn the essentials of this type of management, meantime exerting its authority without having acquired its education fully in such matters, and doubtless has and is still making mistakes which are grievous to the industry and in my view are apt to be still more injurious to the interests of the public itself in the long run. Out of it all, however, is coming an education of the public which will enable it to know the difference between ignorance or crookedness on the one hand, and skill and honesty on the other, whether evidenced by partisans of the companies or of the public. Incidentally this second epoch has been a necessary era of education for the utilities also. Out of it all, I hope shortly we will see the third and lasting epoch of understanding and fair relations because both sides have sufficient knowledge of all the essential facts to be fair and just.

The Full Benefits of a Permanent Business

The ideal of course is such relations as justify investors to have confidence that they may enjoy the full benefits of a permanent business, and that capable, enterprising men may find satisfaction in assuming the responsibilities of management. This is the only path to adequate service at the minimum cost.

From the manufacturing standpoint, the gas industry has experienced two epochs, and I believe is now about to enter the third. The first and longer epoch was that of the manufacture of coal gas, the product of the destructive distillation of selected grades of bituminous coal. This was also the era of the flat flame burner and of gas lighting, experiencing the usual conditions of a lighting business, of short hour consumption concentrated in a definite part of the 24-hour day.

Once, at Least, the Gas Man Leads the Race

The second era was a natural result of the development of the petroleum industry. An enterprising gas chemist or engineer beat the oil chemist to it for thirty years or more by chemically altering the composition of that physical distillate of petroleum which the oil chemist did not know how to make otherwise useful, and the Lowe carbureted water gas system rapidly became the dominant means of manufacturing gas. Between the cheapness and ease of handling of the raw material, gas oil costing the gas companies from 3 to 4 cents per gallon, the great reduction in labor, and the smaller investment in generating equipment required, this process nearly put the coal gas plants out of existence, except so far as they were found useful to produce the coke necessary for the water gas generators. From the service standpoint, this era witnessed the development of the incandescent mantle lamp, with its marked increase in efficiency, and the extended use for domestic and small industries of gas heating devices. It became the era of the Bunsen burner rather than the flat flame. This meant a vastly greater consumption of gas by the average consumer, and of much importance, a distribution of the load over more hours of the 24.

Preparatory to what I think of as the third epoch, experience has been acquired in using various grades of soft coal, directly in the water gas generators, instead of the more expensive hard coal or coke, and in adapting vertical coal gas retorts to our various American gas coals. Waste heat boilers have been utilized.

The third epoch is now facing us.

The oil chemist, urged by the increasing demand for volatile motor spirits, has taken a leaf from the gas chemist, saying that if the gas man can decompose this almost useless distillate into permanent gases without excessive loss, why cannot I carry the decomposition only part way and get volatile oils. In my opinion the work of the oil chemists much heralded a few years ago, by which it was demonstrated usable gasoline could be obtained from heavier oils by controlled decomposition, should have been recognized as ringing curfew for the carbureted water gas process. Because of human shortsightedness and also because of the accumulation of burdens of all kinds that at or about the same time came to the gas industry with the great war, the gas industry was not aroused to the situation until suddenly last February our big oil company announced it could no longer sell gas oil, and if it did it would be priced, not as a semi-waste product, but as a valuable raw material for motor spirit manufacture. We are face to face with a 12 to 15 cent price for gas oil, with no limit in sight against markedly higher prices except the cost of denatured ethyl or grain alcohol, as a substitute for motor gasoline.

Use of Heavier Oils in Generators

Some look with hope to the utilization of heavier oils in the generators. Bear in mind that now the oil chemist is wide awake and he has tried to decompose heavy oils. If the gas man can find a way to do so with reasonable efficiency, the oil man will rob him of the fruits of his discovery. Nothing in sight can lead us to believe that the great gain to our civilization brought about by the development of the small gasoline

motor, so universally used not merely for automobile joy-riding, but for small isolated industries, tractors, water pumps, sawing wood, cutting feed, as well as operating Delco systems on the many farms of the country, the fisherman's yawl, the war vessel, and the countless other uses to which gasoline and kerosene are put, very important being the vapor cook stove on the farms and in small towns, for which coal cannot be substituted, can be restricted one particle for the continued manufacture of carbureted water gas. The gas industry cannot bid against these consumers for its supply. The gas industry cannot pay the price for gasoline, put it through an expensive decomposing process in which a part will be degraded to tar and a portion otherwise destroyed, then transfer through an expensive distribution system, in competition with the barrel or can of oil easily delivered and stored and used with ease and efficiency in modern oil stoves by the ultimate consumers.

The known resources of the world in petroleum are far less than in coal. Petroleum is bound, therefore, to be a highly speculative commodity compared with coal. It is so easily handled, is capable of such efficiency in combustion, and has such a variety of by-products and of uses in which coal cannot compete that its price is becoming less and less dependent upon that of coal. I submit that the gas industry has no business to longer attempt to base its life upon such a speculative commodity as petroleum, neither has it any justification to attempt to convert a highly useful, mobile fuel such as the light petroleum distillates are, into a less mobile and but little more useful gas, when coal, a much lower grade fuel in all respects can be ennobled by converting into gas through a modern gas plant.

If we must face definitely and permanently the abandonment of oil in city gas making, what is to be our future progress? Are we to revert to the first epoch and undertake to supply straight coal gas, with the necessity of abandoning our investment in water gas equipment, and reorganize our business so as to handle the large amounts of coal, labor, and especially coke, involved, adhering to the old standards of service? Or shall we think we are facing the beginning of a new epoch in which fundamentally new methods of serving the public may be advantageously worked out, and in which we may hope the joint education of the public and the utilities which has been taking place during the recent period of public control of utilities has progressed far enough so that the problem can be worked out in mutual co-operation?

I believe it is wrong for the utilities to start on this important new era clinging to the past, partly for fear of the public, partly because they can't trust themselves. We ought to start this epoch desiring to get the best results possible for all concerned. The planning should be jointly as far as may be.

The Ideal Positions

There are two different ideal positions to be occupied by the gas utility. One is that it is to be a purveyor of gas primarily and solely if possible. The carbureted water gas plant met this ideal. Fuel materials entered the plant; nothing of any relative importance left the plant but gas. The business end was simple, cost keeping was simple, the minimum bulk of supplies was necessary.

The other ideal is that the gas plant should provide the smokeless fuel required in a modern city. A properly developed gas plant should provide for all those purposes which require heating service throughout the year, so as to give a reasonably uniform load, and to provide solid smokeless fuel in the form of coke, prepared for particular purposes; for large heat production where its efficiency in use would equal or exceed that obtainable by gas and especially those seasonable or intermittent uses which if supplied as gas would throw excessive peak loads for a very limited time upon the system. Winter house heating either by stoves, furnaces, or boilers, is a particular type of heating service which should use coke, easily stored on the consumer's premises against a cold day. This second program means the expansion of the organization of the utility very materially, much greater working capital, and the necessity of operating the plant in such fashion as to produce usable grades of coke. It would be my opinion that the average medium and small gas plant would be better off attempting the first program, leaving the others to big cities.

Getting down to an immediate program, I believe the time has come for a marked change in our standards of service, especially those relating to quality of gas and pressure of distribution. I believe our gas of the future must be made almost exclusively from coal, with possibly a little oil used to prevent too wide fluctuations. I believe it is not feasible, because of the lack of requisite materials, and because of the great financial burden involved, to get our mixed and water gas plants on a straight coal basis in any reasonable time, soon enough to meet the present emergency. I believe, if possible, we should avoid abandoning investment in water gas equipment, but devise means to continue to use it.

Some form of combination coal and water gas plant is then necessary. To avoid the use of oil, and at the same time bring about that ideal of having only gas for sale, a gas of 550 to 600 B.t.u. cannot be produced. Therefore, a standard which will permit of such operation must be adopted. Since blue water gas has a heating value of 300 to 325 B.t.u. and coal gas ranging from 650 down to 525 B.t.u. depending partly on quality of coal and still more upon the extent to which the distillation is conducted, a direct mixture of equal volumes of blue water gas and good coal gas would probably give a heating value of about 475 B.t.u. But the 800 to 1,000 pounds of coke ordinarily left in our present small plants for each 10,000 cu. ft. of coal gas made, should make considerably more than 10,000 cu. ft. of water gas, so that a value of 450 B.t.u. and possibly as low as 400 B.t.u. would be necessary.

Advancing Thermal Efficiency

In arranging works anew, thermal efficiency should be greatly advanced by using the waste heat of the air blast of the water gas generator under the coal retorts, and conversely the coke from the retorts should be charged hot to the generator. Vertical retorts set above the water gas sets would seem to be the logical arrangement. An ideal operation for small and medium sized plants would be gas coal and possibly a small proportion of oil entering; combination retorting and water gas operation, excess coke or partially carbonized coal used to fire the steam boiler, and nothing but gas for

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Schemes That Were Held Fanciful Begin to Be Considered Seriously as Solution of Europe's Fuel and Power Problems

Centralized Manufacture and Long Distance Distribution Again to the Fore—Utilization of Lower Grades of Coal

By L. W. ALWYN-SCHMIDT

The war by disorganizing the whole economic system of Europe has provided an exceptional chance for reconstructing the industrial life of the European countries that cannot fail to exert its influence upon the economic organization of all the remaining world. A clean sweep has been made, eradicating in some cases the industry of whole districts, and it is sure that in rebuilding these, many of the mistakes of former years will be eliminated. The gas industry is bound to profit by this situation. The return of hope for future prosperity, in fact, begins to show by a vigorous discussion of all the fundamental changes that will have to be made and the possibilities that may develop from the present condition. Not every proposal coming to light to-day, of course, may be practicable if tested under real working conditions. But there is enough in the present situation that demands the interest of everybody employed in gas production and to make worth while a study of some of the projects under discussion.

One of the propositions, seriously considered to-day in England, is the production of gas in large quantities, somewhere near the coal mines, and the transportation of the ready gas by way of large pressure mains to London and other large centers of consumption. This proposal is in bearing with similar propositions made for the concentration of electrical production, but it has the great advantage of saving the by-products of coal in addition to the power production. The project, as standing to-day, provides for the erection of a giant gas generating plant somewhere in the Midlands in the immediate neighborhood of the coal mines, and the laying of a system of gas pipes that will carry the gas to the consumer in bulk, very much in the same way as is done to-day in the case of water. Of course, the construction of such pipe lines would provide a great number of special engineering problems. Engineering art and science, however, have overcome quite as great difficulties as those offered in the construction of a high pressure gas main of somewhat unusual size. The economic argument in favor of such a plan seems to be fairly convincing. At the present time the coal required for supplying the various gas plants in and around London, for instance, is shipped from the mines over a number of railroads. Part also comes by water. To handle this trade a large number of vessels and railroad cars are required, not to speak of the loading equipment at the point of collection and the unloading and charging equipment near the gas plants. Coal has to be collected and stored by a number of local enterprises which in each case requires a separate coal handling plant near the generator and the necessary space for storing the reserve coal. The annual investment charge upon the coal reserve, the handling equipment, etc., is necessarily very heavy.

Great Economies in Central Production

The new plan which proposes to handle the generation part of the work right near the coal mine would do away with the necessity of transporting coal and its double handling. Coal would be moved over short distances to the generators and would be handled as it comes along. Under such an arrangement there is no necessity for each plant to hold large coal reserves, as these would be provided by the mines themselves, and it would certainly be easy enough to hold in readiness a two weeks' supply. The element of chance connected at the present time with railroad transportation would be completely eliminated. The place of the railroad would be taken by the pipe line. This pipe line, of course, represents a certain and rather heavy investment. It would have to be laid in part underground, but it seems that a system of lines might be constructed giving full protection to overground piping at least during large sections of the piping system. It is a question for the accountants to say whether railroad transportation of coal or bulk piping of the ready gas will be cheaper. The supporters of the scheme say that the pipe line will be the cheaper medium. They base their opinion not only upon the cost of piping, but upon the resulting savings in manufacturing equipment that cannot be overlooked in studying such an enterprise. If the generating plant is situated near the coal mines a generating equipment can be provided much more powerful and therefore much cheaper than the present generating equipment even of the largest gas plant. Instead of a great number of generating plants, there would be one, working at the top notch of efficiency and producing gas much cheaper than can be expected from any individual plant.

Putting to Use Inferior Coal

Naturally this would do away practically entirely with local gas generation and the existing enterprises would not continue to be gas making companies but become merely distributors. This phase of the case has been argued in various ways and there seems to be the opinion that such an arrangement would make these companies even more prosperous than under the present system of individual generation. All plants participating in such scheme of co-operative generation would be financially interested in the organization of the central plant. They would buy from it their gas and would sell it at the local rate to the consumer. An additional enormous saving, no doubt, would result from the co-operative handling of the by-product plants.

There is a rather interesting German proposal that deals with that particular difficulty and also takes into

consideration the use of inferior coal beds for gas making. At the present time only the best grade of gas coal can be employed for gas making or has been employed at least in the past until the war forced the European gas works to many expedients.

Germany is now very favorably placed by having a large belt of shale and turf moor beds in the southern parts of Hanover, Brunswick and passing southwards as far as Wurttemberg. It is estimated that in this belt alone 13,000,000,000 tons of shale and 150,000,000,000 cubic feet of turf can be found. These turf beds have not been employed for any practical purpose in the past, with the exception of small shipments that were made to individual consumers.

The German government, desirous of remedying its very serious coal situation caused by the withdrawal of part of her former coal possessions, has made a very intimate study of the problem, how to make use of these turf and shale fuel reserves, and experts who have been employed on this work have come to the conclusion, that the gas industry offers by far the best means of making these riches available to the German nation.

The result of this investigation is a decided victory of the gas industry in a time when every sentiment in Germany seemed to favor electrical expansion in favor of gas application.

The proposal, as standing now in the case of the German project, does not intend to transship great quantities of coal gas from these turf and shale sources to consuming points, but rather to combine the advantages of the gas industry with those of the electrical industry, by having electricity produced by gas. It is argued that a ton of the coal in question, properly used, will produce 408 kilowatt hours electricity, 70 pounds of tar approximately, 8 pounds of pitch, 8 pounds of paraffin, 8 pounds of solid oil and 20 pounds each of two by-products that may be selected. The electrical energy, gained by such an enterprise, would be practically a by-product, seeing that the other products alone would pay for all the outlay and give to the State a substantial benefit on the undertaking.

The electricity, therefore, might be used for supplying electrical power to the German State railroad system which at the present time is a very wasteful coal consumer, needing 12,000,000 tons per year alone. Steps for the electrification of the roads have been taken already. Also there is the prospect of extracting edible fats from the tar products which would be another attraction in favor of using gas.

England also possesses large shale and turf regions that could be used just as favorably as those of Germany.

Scotland would have its electrical power practically for nothing. Italy might make use of its lignite beds and enormous possibilities are opened for Austria, Hungary, Russia, and many other European countries.

Many Savings in Centralized Generation

Taking up first the financial argument there is much in favor of such a concentration of gas making outside the actual saving of energy. If a very large gas generating plant, equipped with the most excellent by-product system could be operated in any coal center, this plant would be self-sustaining in various ways. One of the great obstacles to by-product manufacture in even the largest gas plants is that it has in no case been possible to use up the by-products completely. There must be always a loss, because every sort of plant produces a waste of some part of the coal contents. This element of waste increases with the decrease of the size of the plant, and there is a point, where by-product production becomes uneconomical, because its cost is too high in comparison to the profits that may be obtained from the sale of the product. In the case of such a large co-operative plant this element of waste could be completely eliminated. The surplus products, left over by one by-product plant, can be handled by another in the same organization that will take over the product and complete the work. All will be done right on the spot and the whole system of plants can be constructed so perfectly as to leave practically no loophole for waste. The financial benefits of such a policy naturally must be very considerable and, accepting even the possibility of a decrease in the price of the product, the large plant must always be superior to any smaller enterprise. The gas plant operating so cheaply owing to its enormous earnings from the by-products can then take into consideration the policy it intends to follow with reference to the further handling of its business. It can either sell gas by way of its component local distributors or it can sell gas and electricity combined.

Large gas containers, of course, would still have to be retained in each city as it would be necessary to accumulate the gas arriving during the day for the purposes of the night load.

A plan has also been suggested for eliminating the present inconveniences of the surplus of the winter load and the summer load by way of such a concentration of gas production. It would be comparatively easy to attach to the by-product plants of the central plant an electrical nitrate plant that could be worked during certain seasons only with the surplus energy obtained from the surplus gas production and could be shut down again when the load reaches the peak during the winter months.

Turning now from the purely financial considerations to those of a more national character, the advantages of such centralization of production under present European conditions cannot be overestimated. Germany, where organizing ability possibly is highest developed and where the need of early readjustment is greatest as its debts are the heaviest, must find urgently a way of providing herself with raw materials and energy derived from her own resources. If she can do so by improving the conditions of her gas industry she gains enormously in every respect, and the production of by-products won either by concentrated production or by individual plants, therefore, is a matter of the highest importance. Considering the long list of by-products that can be withdrawn, to-day, from coal without affecting in the least its gas producing powers, it is sheer waste to continue the present practice of gas making and there is every evidence that it will be stopped in Germany in the near future. The present investigations are only introductory to such a step and the public at least seems to be ready to countenance any project that will help.

For England the possibility of using her shale and turf resources for gas making brings incidentally the solution of another of its economic problems, that makes well worth while the attempt. Since many years the question of using the large shale oil resources of Scot-

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As the Journal Views It

Snobbishness in a New Group

Snobbishness we have regarded as being confined to the near-rich, the unintelligent apers of the rich and the new rich.

But close by us there is a locality where carpenters are getting five dollars a day and there are more applicants than jobs. In the same locality—a small one at that wherein everyone knows the business of everyone else—there is a pipe line under construction. They are paying six dollars and a half a day for ditch diggers and cannot get men enough to man the job.

As a class we are getting too aristocratic in this country and too finicky to do the close to the soil kinds of work.

In most well regulated households the head of the family tended the furnace last winter. It was beneath the cook's dignity.

An aspiration to be an aristocrat might appear to some people a worthy ambition. But an aristocracy cannot function without its commoners. And the difficulty around these parts is no one is willing to assume the more humble role, even if it pays better.

An asinine sense of position and the privileges thereof is one of the things that troubles this country most just now. We need to get back to common sense.

The rank and file will follow its leaders. Perhaps if the manager will forget for the time being that he has a secretary for such purposes and demean himself to the extent of sharpening his own pencils, the fitters might take the example to heart and sometimes, for the sake of expediting the job, lend a hand as helper.

Ready When the Time Comes

There is much to indicate that we are about to leave behind us the depressing period of woefully inadequate rates.

There seems to be a realization apparent on the part of the public and its regulatory representatives of the real need of relief to gas companies, the real justice of their pleas and a determination to stomach, as a necessity, the disagreeable burden of adding one more item to the public's cost of living.

Various factors have brought this about. One of them is the impairment of service that, strive though they would, the gas companies in their impaired financial condition could not avoid.

Because of the educational work the companies have carried on, the public knows these shortcomings were not the product of evil connivance, but rather of sheer helplessness.

The public had become accustomed to superb gas service. Anything short of that seemed to it an intolerable vexation.

It could not fault the gas company that it did not succeed in accomplishing the impossible. But, with adequate rates, the impossible would become possible.

The public has studied the situation and has convinced itself that superior service is worth the extra price that will have to be paid for it.

And it is with the idea of once more getting that kind of service it had once known that the public has come to look with consenting mind on adequate rates.

If at the instant relief is granted the public does not see imediate improvement in service, a bad impression will be created. This is an unreasonable attitude, an unreasonable expectation, but such is the reasoning of human beings in mass and it must be reckoned with and met.

It is time we begin to get ready. Time we readjust our mental attitude towards selling new business. Time we let those salesmen we still retain know that we expect them once more to dig in hard after the orders. Time we bring in new blood and get up the enthusiasm of our commercial department.

We have been a long time influencing the public mind to do justice by us. Now that it has arrived at the point of willingness we must be ready to do justice by it, and justice as determined by its mode of reasoning—not ours.

We must not let the public get the notion that a willingness to do its part meets only with indifference and lack of appreciation on ours.

Schemes That Were Held Fanciful Begin to Be Considered Seriously as Solution of Europe's Fuel and Power Problem

(*Continued from page* 28.)

land had been discussed in England without bringing about, however, any real solution because the cost of extraction seemed to be too high, to make the project commercially profitable upon a very large scale. War conditions have changed the situation, but even so it is more than doubtful whether it will pay to extract oil in large quantities from the Scottish shale beds. The purpose of extraction, of course, is not only that of getting the oil but rather of receiving the energy, derived from it. If this energy can be obtained by another and cheaper way than that of extracting the oil the other method certainly would be preferable. The use of the turf and shale for the production of gas and the generation of electricity apparently would be such a method, considering that it releases also many of the by-products that are lost otherwise in the extraction of the oil.

Developments in Europe Reflect Upon Industry in Other Countries

Nobody will doubt that such a development in Europe will have far-reaching influences upon the development of the gas industry in other countries. One of the impediments to the free development of that industry in the past has been always the need of transporting coal over long distances. It might now become possible to make use in many countries, that have no high grade coal to speak of, of the lower forms of coal that are found in many regions practically all over the world and pipe the ready gas to the gas consuming centers. To ship these lower grade fuels to the generators, as a rule, does not pay as they are taking a great deal more cargo space than coal and in consequences are rather expensive in comparison to their gas extraction value.

Europe, of course, deals with all these problems at the present time principally as concerning European conditions. There is no time in Europe to worry about the developments in other countries; whatever benefits will come to the gas industry of other countries as the result of the European experiments must come by the action of these countries themselves.

Let us repeat, therefore, again these tendencies:

Utilization of lower grade coal for gas making.

Concentration of generating and far distance distribution.

Complete utilization of the by-products.

Elimination of coal as direct energy producer for the electrical industry in favor of power production by gas engines.

Elimination as much as possible of the necessity of shipping coal for any purpose.

There is enough revolution in that program as to satisfy our most progressive engineers and gas men. We may not be inclined to follow unreservedly any example that Europe may set us in one or the other respect, but it certainly will be worth our while to watch carefully conditions in Europe, because it may fall to our lot to help applying the lessons in other countries. With conditions in Europe as they are it may be the American gas industry that will have to supply gas equipment to South America, Asia and the other parts of the world where the gas industry is looking for new fields of enterprise.

Where Gas Enters in the Enamel Business

(*Continued from page 24.*)

Remarks: See note below.

(Note—The salts of silver are also used but are difficult to manage. If a thin film of oxide of silver be spread over the surface of the enamel to be colored, and exposed to a moderate heat, then withdrawn and the film of reduced silver on the surface removed, the part under will be found tinged with a fine yellow. Superior yellow enamels are less easily produced than most other colors; they require but little flux, and that mostly of a metallic nature.)

WHITE NO. 1—

Material: Calcine, 1 part; fine crystal or frit, 2 parts; a trifling quantity of manganese.

Remarks: Powder, mix, melt and pour the fused mass into clean water. Do this three or four times.

(Note—Observe to avoid contamination with smoke, dirt or oxide of iron. This gives a fine dead white: 2 parts of tin and 1 part of lead calcined together.

WHITE NO. 2—

Material: Washed antimony, 1 part; fine glass (perfectly free from lead), 3 parts.

Remarks: Mix and proceed as before. Very fine.

(Note—For white enamel the articles must be perfectly free from foreign admixture, as this would impart a color. When well managed, either of the above forms will produce a paste that will rival the opal.)

The writer will give some further miscellaneous enamels further on as many are too important to be omitted. What have just been presented, however, are mainly used for the very highest grades of workmanship and generally speaking, are all of foreign origin, some, in fact, being quite old, but all the same the gas man may put the fullest reliance on them. Work of this character is being done to a greater extent each year in the United States and although the number of those carrying out these operations is not as large in number as some other industries, yet the load is reasonably good and above all is long hours in the majority of cases.

Quasi Enamels

We have referred briefly to one or two semi-enamels already. We wil now include a black enamel for wood, which will give an idea as to the wide difference between that and the true enamels we have dealt with.

The wood is primed with linseed oil which is boiled in a kettle and then mixed with turpentine and white lead. It is then coated with the "enamel" which consists of straight black mixed with copal varnish and turpentine. It will thus be seen that the difference is very marked. The rest of the treatment usually consists in rubbing it down when dry with pumice stone and water, and finally varnishing with copal. Sometimes it is again rubbed down and polished with oil and rotten stone to obtain a perfect smoothness.

It will thus be seen that some difference ought to be made in the terminology, and no enamel should be so called unless having the general form already dealt with.

Common Metal Enamels of the Glazed Type

The use of colored enamels on large surfaces has made enormous strides in the last two decades and will doubtless grow wider yet in years to come.

The ordinary gray enamel (so called) is really not strictly an enamel but a transparent or rather a translucent glaze, the apparent gray color of which is produced by the surface of the iron beneath the glaze.

The following tables give the forms of these enamels:

GRAY MIXTURE ENAMEL (Old Style)

	Lb.	Oz.
Sand	10	0
Red lead	33	0
Boracic acid	20	0
Cullett (broken glass)	114	0
Bicarbonate of soda	16	0
Niter	1	2
Manganese	0	8

GRAY MIXTURE ENAMEL

Flint	36	0
Boracic acid	24	0
Bicarbonate of soda	24	0
Niter	18	0

WHITE MIXTURE ENAMEL

Cullett	11	0
Boracic acid	7	0
Bicarbonate of soda	0	4
Phosphate of lime	3	8
Oxide of antimony	0	2

Pyrometric Cones

It has been found a great convenience for the amateur whose experience has ben limited as well as for the professional who wants to gauge his heat exactly to use pyrometric cones. They consist of a small triangular clay test piece of regular increasing fusibility which are placed in the kiln or muffle furnace with the material or ware being fired, and are watched through a peep-hole. As the cone fuses and bends, the point touching the base, the proper heat for that cone has been reached, a little pinch of clay around the base will keep the cone upright.

The following is a list of the fusing points of certain cigar cones. They cover the range of heat used in firing vitrifiable oven glaze colors, gold and lusters on metal, china, glass, etc.

No of Cone	Deg. Fahr.	Deg. Cent.
.022	590	1,094
.021	620	1,148
.020	650	1,202
.019	680	1,256
.018	710	1,310
.017	740	1,364
.016	770	1,418
.015	800	1,472
.014	830	1,526
.013	860	1,580
.012	890	1,634
.011	920	1,688

Of these No. .017 represents the heat usually employed for liquid bright gold and the majority of overglaze colors are made to work best at this heat.

Enameling on Porcelain

What is usually called "painting on china" is in itself so big a subject as to call for a separate article on this phase of the utilization of gas for firing the product, in fact many pages might be written on the goods used alone. A brief outline only will be given, therefore, and more will be said on the subject in later discussions.

Dealing with the work done on porcelain slabs, the artist often sketches in the subject with India ink. Then the work is commenced for the first firing. The work can either have a background or can be painted without one, and here the skill of the artist is first tried. The product of combustion should not enter the body of the kiln or the enamels may be injured by the products of combustion, but the old fallacy that of was the only fuel of value has long since died a natural death and gas now holds its place in the field.

The background in the first coloring is often pressed in with a small dabber and then the subject taken out and arrayed, of course, according to the lights and darks and colors of the picture. A first, a second, a third and perhaps a fourth firing may be required as the work goes on, shadows darkening, tints brought out and the background receiving the most beautiful and effective stippling until at last this work of art stands out as a splendid work of technical ability.

Gas men who have an opportunity should see for themselves the lovely results which are brought about and whether the kiln be large or small they will benefit in more ways than one in following up their customer.

The types of enamel used for this work are all similar to those which have been already given with, however, some important variations. It is hoped, however, as already mentioned, to refer to these more in detail in a later article which will cover the last mentioned use of enamels to a far wider extent.

Sees the End of Use of Fuel in Gas Making

(*Continued from page* 26.)

sale, except possibly some tar. It is well known that the first half of the gas distilled from a charge of coal is much richer than that evolved towards the end of the coking process. Much heat and time, with resulting effects on the setting, are used to drive out the last of the gas and especially to yield a decent grade of coke. A promising field of study would be whether the capacity of any retort could not be greatly increased and its life per M gas produced prolonged by not attempting to distil all the gas, but when three-fourths or so of the gas (which includes the richer gas) had been driven out, draw the coke still hot to the water gas generator and complete the conversion of the coke into gas. Recent experience with soft coal in water gas generators, have taught us how to handle any green coke, especially when we remember that hot green coke is much more cohesive than when cold.

Lowered B.t.u. as It Will Effect Distribution

Lowering the B.t.u. would necessarily increase proportionately the volume of the send-out. To get the same number of B.t.u. per hour through a consumer's burner, would therefore require either larger mains, orifices, etc., or higher pressure. The larger mains are out of question. Suitable increase in pressure would be necessary, and in my opinion can produce no detrimental results in the long run. Small leaks, now unperceived, would be manifest, otherwise the joints, cocks, etc., should not be affected.

From the standpoint of the company the whole proposition of a change in standard reduces to whether a million B.t.u. can be delivered cheaper as 450 B.t.u. than as 550 B.t.u. or some other standard gas. Reduction in one item of expense means increase in another. Less oil means more generator fuel per M made and possibly per B.t.u. Higher pressure means more cost for pumpage and possibly higher leakage. Only direct experiment, intelligently controlled, or study of plants operating on similar standards can determine it.

From the standpoint of the consumer, first of all, the new standard gas must work efficiently in his existing equipment, with inexpensive adjustments or changes. Secondly he does not submit to a change in quality without a readjustment in price, because to him the usefulness of the gas is almost exactly in proportion to its B.t.u. content. Its efficiency to the consumer must not be reduced by increasing the percentage of non-combustibles. The B.t.u. change should be the result of only changes in the proportion of the different chemical combustible constituents of the gas and not by dilution with inert gases.

As this is a period when upward readjustments of price are just and necessary, the new price should be worked out on the basis of the cost of supplying the new gas, with the least friction or hardship. Interesting experiments by the Bureau of Standards tend to show that uniformity in specific gravity of the gas is important at the burner.

Personal experience shows that 450 B.t.u. carbureted water gas can be used with fair satisfaction in ordinary household appliances by closing the air shutters.

My personal attitude at the present time is a readiness to try any change in standard which preliminary investigation indicates may be successfully used in domostic appliances, provided the gas company has facilities to distribute the increased volumes satisfactorily, and provided it has a good cost keeping system, so that it can be proved what a certain quality of gas costs in comparison with the old qualities. The emergency faces us that positive lack of a supply of oil may require some companies to reduce the quality markedly, and suddenly, or cease service altogether. It would be better to plan such changes now while some oil is on hand, which would allow of meeting an emergency. The whole transaction must be frankly exhibited so that the intelligent part of the public need have no suspicion that the gas industry is up to a trick of essentially raising its price.

When I first planned this paper, I had hoped to get positive data, but my sources failed me. I believe, however, the general principles outlined are worth your consideration, and I hope and trust that progressive engineering and chemical skill will lead the gas industry out of its present distress into a large measure of prosperity, satisfaction and service. If any company in Virginia believes it is in position to make a practical test by operating at a markedly lower standard, and is ready and willing to open all the data and results to those interested, I believe the State Corporation Commission of Virginia will co-operate to the fullest extent.

Selling the Best Appliances and at Fair Profit Sure Way of Establishing New Business Department on Profit Earning Basis

J. A. Fornery Advocates a Fixed Sale Price for Appliances—the Public Wants the Best and Is Willing to Pay for It.

The new-business department of a gas company cannot only be made self-sustaining and a profit-earning department, but is the greatest asset that any company can have, because of the personal touch or the rubbing of shoulders with their customers through the salesmen of the new-business department, declared J. A. Fornery, Charlotte, N. C., in a paper before the recent convention of the Southern Gas Association.

This fact is particularly true in our Southern cities, where the ties of kinship or the natural sociability of the Southern people bring about an intimate acquaintance of almost the entire population.

These people, particularly the ladies, get together quite often, either in a social way or through church societies; and, of course, the ladies have just got to have something to talk about. I don't know what your experience has been, but it seems to me that the chief topic of conversation at these meetings is the gas company and its service.

These discussions can be made favorable or unfavorable to the local utility only through the way its service is rendered. We all want to render 100 cents' worth of service for every dollar we receive, and have every customer a booster; but this cannot be done by just setting a meter and rendering a bill each month for the gas used. We must keep in touch with our customers and correct any mistaken ideas they may have about the company's policy and look after their small complaints.

Highest Type of Salesman Necessary

This can only be done through salesmen of the highest type. These men are hard to get and naturally demand substantial remuneration for their services.

Most of us are and have been for some time selling gas on a very small margin of profit and, of course, have not been justified in paying the price necessary to hold this type of man; but we can all add this man's salary to the price of the appliances we sell, and let our customers in this way pay for the service they demand. Our good American people want and demand service, and don't give a hang how much they have to pay for it so long as they get service.

Times Have Changed

This old idea of giving appliances away or selling them at cost has done the gas industry more harm than anything I know of. Our customers don't want cheap merchandise, nor do they want good merchandise cheap. They want the best and are perfectly willing to pay the price.

Of course, the last two years have been abnormal; the price—the highest price—has been the greatest factor in selling gas appliances or any other merchandise, and any gas man who has failed to take advantage of this opportunity to make a good profit on the sale of appliances and get his prices up to a point where he can make money on them has, to my mind, missed a golden opportunity.

There is no good sound business reason that will excuse a man for allowing his gas sales to stand a loss resulting from the sale of appliances. Primarily we are all interested in increasing the gas sales on our existing lines with as little expense as possible. It is, therefore, of vital interest to the gas company to see that its consumers use the best appliances they can buy.

The gas company can't sell them all, and there is a demand made on the furniture dealers and plumbers for appliances.

How in the world do we ever expect to get the best appliances out on our lines if we insist upon selling our appliances at such a small profit that the furniture dealers and plumbers can't compete with us with the same quality of goods?

Some of you may feel that your consumers have been buying appliances at cost for so long that you might as well go out of business as to try to raise the prices. If anyone has this idea you want to get it out of your head right now.

Up to a short time ago we sold appliances in Charlotte at cost, not at the cost of doing business but at the actual cost of the appliance; in fact, in most cases we actually paid our customers to take an appliance and use it. We made no charge for connecting ranges or for small piping jobs.

Selling Appliances at a Fair Profit

When we finally decided to sell our appliances at a profit and make the new-business department stand alone, we were met with severe criticism and were offered all kinds of advice from within our organization. The question uppermost

in everyone's mind was, How much profit are you going to add to the appliance? and look out that you don't go higher than the dealers and throw all the business their way and get our customers all down on us for profiteering.

We didn't want to profiteer; but our dealers' price didn't worry us in the least, for we knew that our laws would uphold any man in business who was making a reasonable profit on the capital invested and that if he didn't make a reasonable profit his creditors would see to it that he didn't stay in business very long.

With this fact perfectly clear in our mind we started an adjustment of prices.

After finding out what it was costing us to do business, which is the most important factor when it comes to setting a price on any piece of merchandise, and adding this to the cost of the appliance, plus a fair profit, the cost of installation and salesmen's commission, we found that most of our appliances were advanced 90 to 100 per cent over our old sale prices.

Then we started charging for all piping work and for labor to connect appliances where no material was required.

I must say that there was a certain element that raised all kinds of objections to the charges for piping; but I have never heard any serious objections to the increase in the prices of appliances, and the result has been that the dealers, as well as ourselves, have sold more and better appliances, and I know we have much better satisfied consumers.

At a recent meeting in Greensboro of the North Carolina Gas Association, called for the purpose of arriving at some basis for a rate commensurate to the gas companies and the public, nineteen out of twenty-one companies were represented and some startling facts were revealed. Some companies were drifting along on their old contracts for coal and oil, and had apparently given no thought to the future high costs of labor, coal and oil.

I venture to say that if such a meeting were called for the purpose of comparing the prices charged for appliances even more startling facts would be brought out.

I consider it just as necessary for us to get together on the prices we charge and adopt some basis for a uniform scale price, so that when a consumer moves from one city to another he will find the charges for a given appliance or piping work to be in keeping with those charged by the other companies.

Sales Force of the Hoffman Heater Company Holds First Annual Convention

The first annual convention of the sales force of the Hoffman Heater Company took place at the new Lorain, O., factory during the week of June 7 to 12, the branch managers and agents from all parts of the country being present and prepared for an interesting and instructive, as well as pleasant, meeting. The men were all registered at the Hotel Cleveland and were transported to and from the factory in taxicabs.

The first two days of the meeting were devoted to papers prepared by the various managers and were the subject of much discussion, the outcome of which was instructive and constructive. The last day was devoted to general discussion in the morning session and was consummated in the afternoon by a trip to Cedar Point by special car, where all enjoyed the many amusements and diversions offered by this resort. The banquet held in the private dining room at the Point was the scene of much merriment and speechmaking.

The meeting had the effect of carrying to the various managers a new idea and conception of the company—a realization of the immense growth that has taken place in the last few years. It brought them in close and personal touch with the management, and they all returned to their respective places with the thought that back of them is a big, strong, growing institution.

Among those present were many old representatives and water heater men whose names are familiar to many in the field, including: C. L. Fairfield and W. L. Hallett, Boston, Mass.; W. Howard Arrighi and J. C. Fullerton, New York, N. Y.; J. R. Wheeler and S. W. Barrow, Washington, D. C.; George B. Stewart, Pittsburgh, Pa.; R. B. Lees, Cleveland, Ohio; G. S. Perrine, Akron, Ohio; E. J. Baumgardner, Cincinnati, Ohio; H. V. Bomar, Louisville, Ky.; F. A. Collins, Chicago, Ill.; E. R. Clark, Detroit, Mich.; F. S. Gouldthrite, St. Paul, Minn.; J. G. Gouldthrite, Minneapolis, Minn.; A. S. Davis, St. Louis, Mo.; F. H. Parker, Tulsa Okla.; L. M. Taylor, Dallas, Tex.; J. A. Kimmel, Fort Worth, Tex.; George H. Littlejohn and Henry Eggers, San Francisco, Cal.; H. S. Harris, Oakland, Cal.; E. H. Chester, Los Angeles, Cal.; A. H. Babcock, J. M. Jones T. G. Arrowsmith, F. J. Zinke, R. W. Johnston, T. McGeachie and W. A. Donaldson.

Dividends Declared

H. M. Byllesby & Company has made the following dividend announcements:

The board of directors of the Northern States Power Company, Minneapolis, Minn., has declared the regular quarterly dividend of 1¾ per cent on the preferred stock of the company, payable July 20, 1920, to stockholders of record June 30, 1920.

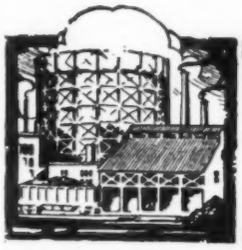
The board of directors of the Western States Gas & Electric Company, Eureka, Cal., has declared the regular quarterly dividend of 1¾ per cent on the preferred stock of the company, payable July 15, 1920, to stockholders of record June 30, 1920.

The board of directors of the Ottumwa Railway & Light Company, Ottumwa, Iowa, has declared the regular quarterly dividend of 1¾ per cent on the preferred stock of the company, payable July 15, 1920, to stockholders of record June 30, 1920.

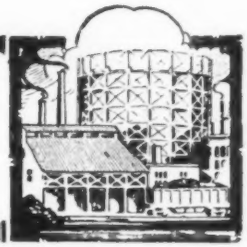
The board of directors of the Mountain States Power Company has declared the regular quarterly dividend of 1½ per cent on the preferred stock of the company, payable July 20, 1920, to stockholders of record June 30, 1920.

The board of directors of the Shaffer Oil & Refining Company has declared the regular quarterly dividend of 1¾ per cent on the preferred capital stock of the company, payable July 24, 1920, to stockholders of record June 30, 1920.

The United Gas-Electric Company, New York, declared the regular semi-annual dividend of 2½ per cent on the preferred stock, payable July 15 to stock of record June 30.



NEWS OF THE GAS INDUSTRY



Embargo Put on Coal from U. S. to Europe

A virtual embargo upon the shipment of coal to Europe or any other part of the globe from North Atlantic ports of the United States has been declared in order that New England's threatened industries and utilities might receive priority in the matter of fuel shipments. The order, which was determined upon by the Interstate Commerce Commission at a meeting in Washington on June 19, was made public at the office of J. W. Howe, commissioner, at the Tidewater Coal Exchange.

Similar priorities, it is understood, will be ordered for New York, Philadelphia and Baltimore, where transportation companies and other public utilities are feeling the pinch most keenly. Lack of cars rather than lack of coal is at the bottom of the shortage.

Under a rigid interpretation of the order no ship in a port from Charleston north to the Canadian border could obtain even bunker coal to take her to Halifax or some other near-by port not in the United States, but it is unlikely that the order will be carried out so strictly. Commissioner Howe, as the representative of the Interstate Commerce Commission here and in Philadelphia and Baltimore is intrusted with the issuance of permits for shipments to piers and is directed to issue such permit "only upon a showing that the destination of the water movement of such coal is a United States coastwise point, or if otherwise, that the preference and priority hereby directed (to New England) will not be impeded thereby, and in any event that the shipper or consignee will be able to unload such coal at the port of transshipment without delay to the rail equipment." Other commisioners in Charleston, Newport News and Norfolk have similar orders.

While it was being decided to prevent the use of many badly needed cars for transportation of coal destined for Europe, a big get-together meeting was held in New York City between representatives of railroads, the Interborough, B. R. T. and other public utilities and the Public Service Commission. The result was an agreement by the railroads to do everything possible to get coal to the city, and by the public utilities to stand together and lend power or coal to prevent the shutting down of any of them.

The embargo upon foreign shipments of coal will have a marked effect upon shipping, for not only are many foreign owned vessels bunkering here for return trips, but great numbers of American and foreign vessels are carrying nothing but coal to European ports. It is said that 80 per cent of the ships allocated by the United States Shipping Board to steamship companies are under contract to carry coal cargoes. The production of coal in England is reported to be about one-third the normal, and in consequence not only that country but much of Europe looks to the United States for coal. Coal production here is estimated at 60 per cent of normal, but stringency of freight cars has made the shortage much more marked.

In its order the commission makes no mention of the coal shortage, but bases its action upon a "shortage of equipment and congestion of traffic, aggravated by unfavorable labor conditions which continue to exist upon the lines of common carriers."

U. G. I. Dividend Payment

The United Gas Improvement Company, Philadelphia, Pa., announces that dividends on new issue preferred stock will be payable Sept. 15, Dec. 15, March 15 and June 15 to holders of preferred stock of record at close of business on the last day of preceding month instead of being payable Sept. 1, Dec. 1, March 1 and June 1.

Public Service Gas Company Will File New Rate Schedule

Refused a differential rate for gas based on varying costs of fuel oil by the Board of Public Utility Commissioners in Trenton, N. J., the Public Service Gas Company of Newark, N. J., has announced that it will file, as soon as papers can be prepared, a new and higher rate schedule for gas sold to domestic and wholesale consumers. The utilities board declined to permit a fluctuating price because it believes stability is essential in the conduct of a utility company.

The company's statement follows:

"In filing an oil differential to be applied to the price of gas Public Service Gas Company sought to give its patrons service on the most equitable basis of cost it could devise. The oil differential was suggested because oil is one of the basic raw materials entering into the manufacture of gas and because the price of oil is much higher now than it was last August when the gas company made a contract for a year's supply.

"The board of public utility commissioners has disapproved the oil differential and given its reasons therefor. But the fact remains that there is such an increase in the price of oil that the gas company cannot go on making gas at the new costs and selling it at the present rates. Nor are the increases confined to oil alone. Coal has taken a big jump and labor has long since demanded and is receiving higher wages than those prevailing when the rate for gas was fixed at $1.15 per 1,000.

"With these conditions confronting it the company has no alternative but to file a new rate for gas that will cover the new increased costs of manufacture. Such a rate will be filed as soon as the papers can be prepared. It will not be designed to increase the profits of the company and will be kept at the lowest figure

that will meet the exigencies of the situation.

"The conditions which the gas industry faces throughout the country are almost insuperable. Such basic materials as oil and coal are far short of normal production quantities and the demand for them is greater than ever. Coal is not being mined to the same extent as in some other years, and more is being exported than usual. The output of crude oil has fallen off materially and at the same time the production of gasolene has increased to such an extent that the volume of gas oil available for the manufacture of gas is millions of barrels short of former years.

"On top of all this the inability of the railroads to function to capacity has retarded shipments of such coal and oil as are produced. All of which creates what is regarded as the most acute situation that has ever confronted the gas companies, and the general public has no conception of the difficulties encountered by them in procuring enough basic materials for the manufacture of gas."

Peoples Gas Light & Coke Company Granted Temporary Rate of $1.15

Gas consumers of Chicago, Ill., are to pay $1.15 per 1,000 cu. ft. for their gas until further notice.

The Public Utilities Commission has made public this new rate, but in a statement issued declared that the rate is temporary only and will be revised as soon as the hearings now on as to the valuation of the Peoples Gas Light & Coke Company properties have been concluded and the actual value of the properties has been determined.

The rate quoted is the one that the small consumer—the householder—will have to pay. For those using gas in wholesale quantities, such as public buildings, manufactories, etc., the new rate is fixed at $1 per 1,000 for all over 50,000 ft. used. The old rate was 85 cents per 1,000 cu. ft. for all over the first 350 cu. ft. used, the first being rated at 35 cents per 1,000. Under the new rate the first 400 cu. ft. or less will cost 60 cents per 1,000.

In the statement issued with the order the commissioners declared they found after weeks of inquiry and hearing testimony that the evidence showed the company has been losing money at the rate of 11½ cents per 1,000 cu. ft. of gas, or approximately $10,000 per day. This the commissioners set forth, is due to the increased cost of production—of wages, materials that enter into the manufacture of gas and other items. The evidence showed that the operating expenses have advanced all along the line and that the plants of the company have depreciated in value and efficiency, according to the statement.

It is believed that the hearings as to the valuation of the plants will not be concluded under several months and that even at its conclusion there will be no material reduction in the price of gas.

The order, made public by Chairman James H. Wilkerson, follows:

"The commission has passed an order authorizing increases in the rates of the Peoples Gas Light & Coke Company, the order to be effective until the completion of the pending valuation proceedings. A primary rate of $1.15 net per 1,000 and a secondary or a wholesale rate of $1 net per 1,000 are provided.

"Provision is made for a minimum monthly charge of 60 cents for the first 400 cu. ft. or less.

"The evidence before the commission showed that the operating expenses of the company have greatly increased on account of advancing prices of gas, oil, coke, coal and other supplies. The company has also been required to increase the wages of its employees. The actual cost of producing and distributing gas as shown by the evidence, including allowance for depreciation and taxes, is substantially 96½ cents per 1,000 cu. ft. Under the present 85 cent rate the company has been losing 11½ cents per 1,000 on gas, or at the rate of $10,000 per day.

"The allowance for return on investment is at the rate of 20 cents per 1,000 cu. ft. This represents a fair return on the very lowest value which it is possible to place upon the company's property, as disclosed by the evidence in the case. A lower return would undoubtedly be held by the courts to be confiscatory. The order is temporary in character and is subject to revision when the valuation proceedings are concluded."

Chairman Wilkerson added that the action of the commission was unanimous.

Exhibitors to Date at the 1920 Exhibition of the A. G. A.

Young Bros. Co., Detroit, Mich.
B. Ryan Co., New York, N. Y.
Humphrey Co., Kalamazoo, Mich.
Will W. Barnes, East Orange, N. J.
Baltimore Gas Appliance & Mfg. Co., Baltimore, Md.
General Gas Appliance Co., New York, N. Y.
The Surface Combustion Co., New York, N. Y.
Quick Meal Stove Co. Div., St. Louis, Mo.
The Crandall Pettee Co., New York, N. Y.
New Process Stove Co. Div., Cleveland, Ohio.
Welsbach Co., Gloucester, N. J.
The Eclipse Stove Co., Mansfield, Ohio.
The Michigan Stove Co., Detroit, Mich.
Barnett Foundry & Machine Co., Irvington, N. J.
Robertshaw Mfg. Co., Youngwood, Pa.
Ruud Mfg. Co., Pittsburgh, Pa.
The Milwaukee Gas Specialty Co., Milwaukee, Wis.
Famous Oven Mfg. Co., New York, N. Y.
The G. S. Blodgett Co., Burlington, Vt.
Grinnell Co., Inc., Providence, R. I.
The A. H. Wolff Gas Radiator Co., New York, N. Y.
Hugo Mfg. Co., West Duluth, Minn.
Reliable Stove Co. Div., Cleveland, Ohio.
Wm. M. Crane Co., New York, N. Y.
Walker & Pratt Mfg. Co., Boston, Mass.
Roberts & Mander Stove Co., Philadelphia, Pa.
James B. Clow & Sons, Chicago, Ill.
George D. Roper Corp., Rockford, Ill.
General Gas Light Co., New York, N. Y.
A-B Stove Co., Battle Creek, Mich.
The Kompak Co., New Brunswick, N. J.
Reznor Mfg. Co., Mercer, Pa.
The Ofeldt Gas-Fired Boiler Co., Inc., Nyack-on-the-Hudson, N. Y.
The Bryant Heater & Mfg. Co., Cleveland, Ohio.
The J. H. Grayson Mfg. Co., Athens, Ohio.
Detroit Stove Works, Detroit, Mich.
Union Stove Works, New York, N. Y.
Pittsburgh Water Heater Co., Pittsburgh, Pa.
Weir Stove Co., Taunton, Mass.

Royal Art Glass Co., New York, N. Y.
Geo. M. Clark & Co. Div., Chicago, Ill.
National Stove Co. Div., Lorain, Ohio.
The Cleveland Heater Co., Cleveland, Ohio.
The Improved Appliance Co., Brooklyn, N. Y.
Rathbone, Sard & Co., Albany, N. Y.
The Estate Stove Co., Hamilton, Ohio.
Underwood Typewriter Co., New York, N. Y.
Burroughs Adding Machine Co., Detroit, Mich.
The Lattimer Stevens Co., Columbus, Ohio.
The Cutler-Hammer Mfg. Co., Milwaukee, Wis.
The Sprague Meter Co., Bridgeport, Conn.
Bacharach Industrial Instrument Co., Pittsburgh, Pa.
The Koppers Co., Pittsburgh, Pa.
S. R. Dresser Mfg. Co., Bradford, Pa.
United Lead Co., New York, N. Y.
The U. G. I. Contracting Co., Philadelphia, Pa.
Precision Instrument Co., Newark, N. J.
National Tube Co., Pittsburgh, Pa.
Connelly Iron Sponge & Governor Co., New York, N. Y.
Pittsburgh Meter Co., Pittsburgh, Pa.
American Meter Co., New York, N. Y.
Metric Metal Works, Erie, Pa.
The Roberts Brass Mfg. Co., Detroit, Mich.
Quigley Furnace Specialties Co., New York, N. Y.
Republic Flow Meters Co., Chicago, Ill.
Equitable Meter Co., Pittsburgh, Pa.
The Western Gas Construction Co., Fort Wayne, Ind.
John J. Griffin & Co., Philadelphia, Pa.
The De Matteis Broiler System Co., Inc., New York, N. Y.
Johnson Gas Appliance Co., Cedar Rapids, Iowa.
Monroe Calculating Machine Co., New York, N. Y.
J. B. Slattery & Bro., Inc., Brooklyn, N. Y.

Gas Plant to Be Sold by Receiver

C. E. Paris, receiver for the Imperial Valley Gas Company, El Centro, Cal., has secured from the Superior Court an order of foreclosure and sale at the instance of the bondholders of the company. The property foreclosed on consists of the generating plant in the city and the distributing systems of Brawley, Imperial and El Centro, Cal., and it will be sold at auction.

The company has never been a money maker. The plant when installed was second hand, not in condition, engineers have reported, to be economically handled, and unnecessary expense of manufacturing gas and loss of the product from leaky mains are any possible dividends. Two years ago the company was granted an increase in rate to $2.60 per 1,000 ft., far more than charged in many southern California cities, but loss of business followed, and the company was in worse position than before the raise was granted.

Attempts have been made to sell the plant to the people, but the general impression prevails that too much water has been put into the stock and bonds to make the company self-sustaining even under the best circumstances. Additional capital was recently asked for, and the local capitalists refused because of the belief that increased capitalization would mean nothing more than additional loss.

Under the terms of the proposed sale, the stock will be entirely wiped out, the bondholders will probably collect not more than 25 per cent of their original investment, and the plant will be bid in by some of the bondholders, to be junked unless it can be secured by the cities of El Centro, Imperial and Brawley at a valuation which seems in accord with actual worth.

The three cities do not desire to have the company suspend, but opposition to paying book prices for the dilapidated plant is too strong to permit the city councils to do business with the company on any other than a low valuation. If a reasonable offer for the properties is made to the cities, they will probably take them over.

The Ohio Cities Gas Company, Columbus, Ohio, has appointed the Guaranty Trust Company trustee under the Ohio Cities Gas Company trust agreement, dated June 1, 1920, securing an authorized issue of $10,000,000 per value seven per cent convertible serial gold notes, dated June 1, 1920.

Distribution of Gas Co. Holdings of Interest to General Public Whether Stockholders or Not

The following bulletin has been sent out by the Emergency Council of the American Gas Association to gas company executives:

How is the stock of your gas company distributed?

How many stockholders have you?

To what extent is your public interested in your company from a stockholder's standpoint?

Figures compiled by the Consolidated Gas Company of New York show that 8,275 men and women, estates, etc., are stockholders in the company. Of this number only 1,560 own more than one hundred shares; 1,335 persons are shown each to own one, two or three shares, but not more than nine; 2,704 persons own between ten and twenty-five shares each; between twenty-five and fifty shares are held by each of 1,371, while each of 1,305 others own from fifty-one to one hundred shares.

The Peoples Gas Light & Coke Company of Chicago has considerably more than 7,000 stockholders. This stock is held by school teachers, clergymen, stenographers, lawyers, physicians, dentists, mechanics, policemen, firemen, and many women. Fifty per cent of these stockholders live in Chicago. Many have held their stock for a great many years and have depended upon its dividends for a certain income.

How about *your* gas company holdings? Would not similar facts concerning *your* stockholders prove of great interest to *your* gas consumers and public in general?

If the stock of your company is widely distributed, why not let the public know about it? Will not this knowledge react favorably upon the officials before whom you must go to seek increased rates that your company may meet the unprecedented increased cost of gas-making material and continue to supply an indispensable public service?

Your gas consumers constitute your public. Keep them truthfully informed through your local newspapers of your real needs, and keep officials of your public utility and regulatory bodies informed as to how deeply and vitally your public is concerned.

In doing this you will have taken a long step toward improving your own condition as well as that of the gas industry in general.

Plans Complete for Sixth National Chemical Exposition of Chemical Industries

Returning to New York City after an absence of a year—last year's exposition was held in Chicago—the Sixth National Chemical Exposition of Chemical Industries will open in Grand Central Palace, Sept. 20, and continue until Sept. 25, inclusive. The expansion in the industry, as shown by the increased number of exhibitors, necessitates the use of four floors in the Palace, and Charles F. Roth and Fred W. Payne, managers of the show, continue to receive applications for space almost daily, so great is the interest in the exposition.

Total applications for space up to June 30, were 358, which is a new record. In Chicago last year there were 351 exhibitors, while at the previous New York show in 1918, the number was 334. Considering the fact that the first exposition was staged in 1915 and that only 83 exhibits were in place, the growth of the exposition is really remarkable. The increase in the attendance is also evidence of the interest that has been aroused. In 1915 only 63,000 visitors attended the show, while in Chicago last year the records showed that more than 111,000 had seen the exposition.

Followers of the previous expositions have commented on the changes for the better that have occurred since the initial show. The exhibits are more comprehensive due to progressive development; the type of representatives in charge of the exhibits are men who not only know their business, but are eager to explain the minutest detail to visitors. The visitors themselves have graduated from the curious element to real students of the chemical situation. This fact alone proves the value of the yearly expositions for it is to educate that such shows are held.

During and since the war chemistry has come more and more in contact with the great American industries. In fact, recently the chemical industry has been referred to as "the partner of big business." Manufacturers are realizing on the money that has been put into research and the returns as the experiments progress promise even more wonderful dividends. There is now no doubt but that much responsibility rests on chemistry to bring the activities of the nation back to their accustomed channels. Science without a doubt if given the opportunity, will aid trade.

One fact stands out even in the domestic side of chemistry and that is that during the war chemists taught army cooks more about foodstuffs and feeding than had been learned since Columbus discovered America. This knowledge has seeped into homes.

Two new sections will feature the exposition this year. These are the Fuel Economy Section and the Materials Handling Section. Both are considered very important. Fuel economy section will embrace exhibits of machinery and apparatus, furnaces, producers, stokers and all devices for the economic utilization, or more efficient combustion of fuel. The constantly mounting cost of fuel as well as its increasing scarcity makes enlightenment on these vital subjects necessary.

In the material handling section will be a series of exhibits showing machinery and equipment for the handling of material such as: conveying, transporting, elevating, and included will be weighing, measuring and power transmission equipment. Practically every industry in some phase of its operations must convey its products in some manner. There is a shortage of man power, and when available man power demands a high wage. In the meantime the manufacturer must handle his raw material, material in process of manufacture, and the finished product. It is expected that the material handling section will impress with its features showing that machinery not only means economy, but also increased efficiency.

The business side of the exposition will have many interesting phases. These include sessions on subjects which will be developed in the two new sections of the exposition, and sessions on chemical engineering for which elaborate programs have been planned. Motion pictures which will have keen interest for technical men, will be part of the program and there wil also be addresses for the education of the public.

The committee in charge of the exposition includes: Charles H. Herty, editor Journal of Industrial and Engineering Chemistry, chairman; Raymond F. Bacon, director Mellon Institute; L. H. Baekeland, member Naval Consulting Board; Henry B. Faber, consulting chemist; Ellwood Hendrick, president the Chemists' Club; Bernhard C. Hesse, General Chemical Company; W. S. Sandis, president American Electrochemical Society; A. D. Little, president Arthur D. Little, Inc.; William G. Nichols, chairman board General Chemical Society; W. A. Noyes, president American Chemical Society; H. C. Parmlee, editor Chemical and Metallurgical Engineering; R. P. Perry, vice-president the Barrett Company; T. B. Wagner, vice-president U. S. Food Products Corporation; David Wesson, president American Institute Chemical Engineering, and M. C. Whittaker, president U. S. Industrial Chemical Company.

Massachusetts Companies Declare Dividends

The trustees of the Massachusetts Gas Companies declared the usual quarterly dividend of 1¾ per cent on the common stock, payable Aug. 2 to holders of record July 16. Dividends declared by the subsidiaries, with the exception of the New England Fuel & Transportation Company, are payable June 29 to holders of record June 26. The New England Fuel & Transporation dividend is payable June 28 to holders of record June 26. Subsidiary dividends follow: Boston Consolidated, 1½ per cent; Citizens Quincy, 2 per cent; East Boston, 2 per cent; New England Fuel & Transportation, 1 per cent; Newton-Watertown, 4 per cent.

New Scrubber Being Used with Success by Chattanooga Company

The Chattanooga Coke & Gas Company, Chattanooga, Tenn., is now using with great success a large bubbling washer made for them by the Western Gas Construction Company of Fort Wayne, Ind., and purchased through the Semet-Solvay Company of Syracuse, N. Y.

This type of scrubber has proven very satisfactory. It is a duplicate of previous units in the plant. The general design consists of a number of cast iron hoods covering vapor openings. External overflows are provided to enable the liquor to circulate freely from each section to the one under it. The builders have so arranged the scrubber that any

of these numerous hoods can readily be removed through a door in the side without the necessity of tearing down the entire machine to give it a good cleaning.

Civic Organizations of Chicago Take More Liberal Attitude Toward Public Utilities

Eight of the leading commercial and civic organizations of Chicago appeared before the Public Utilities Commission of Illinois on June 18 and filed a memorial asking that the commission grant immediate relief in the way of financial assistance to the utilities operating in Chicago. The memorial says:

"Inability to supply the demands for public service is not only a serious and continuous menace to the commercial development of Chicago, but some of our citizens are in imminent danger of being deprived of necessary light and heat in their homes and transportation to and from their places of business or employment."

It was asserted that owing to the known financial condition of the utilities and the present state of the money market, which prevents the investment of capital except at prohibitory rates of interest, the various public utility corporations, as a matter of plain business judgment, cannot make any extensions of service except such as are absolutely necessary.

It was contended that the test of the reasonableness of the rate, both to the public and to the utilities, can only be determined by experiment, in many cases where the commission would not have the time to give thorough consideration to the case without working disaster by the delay.

The awakening of commercial and civic bodies to the public utility situation, and the need for a more liberal attitude toward public utilities on the part of regulatory authorities, are matters for immediate consideration. That eight of the leading organizations of this character in Chicago, the second largest city of the country, should take the initiative in such a matter, indicates keen recognition of the consequences which must follow a restricted policy toward public utilities.

Stacey Mfg. Company Appeals to Commerce Commission for Relief

The following is a telegram sent by the Stacey Manufacturing Company, of Cincinnati, Ohio, to the National Committee, Gas and Electric Service, Washington, D. C., asking for relief in the transportation situation:

National Committee, Gas and
Electric Service,
Munsey Building,
Washington, D. C.

On account of ruling of Interstate Commerce Commission under date June 17, effective June 21, relative to loading gondola cars for other purposes than coal, it will be impossible for us to complete gas holder contracts for the following points unless we can get proper railroad equipment, and we appeal through you to Interstate Commerce Commission for relief: Richmond, Va.; Williamsport, Pa. (two holders); Memphis, Tenn.; Granite City, Ill.; Denver, Col. (two holders); Philadelphia, Pa.; Columbia, S. C.; Fond du Lac, Wis.; Port Arthur, Tex.; Baytown, Tex.; Rock Island, Ill.; San Luis Obispo, Cal.; Charlotte, N. C.; Cleveland, Ohio; Winston-Salem, N. C.; Chippewa Falls, Wis.; Ludington, Mich., and Baltimore, Md. On account of coal shortage last year and threatened shortage this year, many gas companies are preparing to heat homes this coming winter with gas, and abovementioned points have not sufficient storage capacity to take care of the demand unless these holders can be completed by fall. We have fabricated and ready for shipment in our shops approximately fifteen cars of material for forwarding to various points. The steel companies in the Pittsburgh district advise that they have approximately twenty cars of raw material for us which will have to be shipped to Cincinnati for fabrication in these structures. Can we not secure permit from Interstate Commerce Commission for loading gondola cars for shipment to above points? Also permit for loading gondola cars at Pittsburgh with raw material now ready? Will send representative to Washington if advisable. Immediate action imperative and we request you advise us at earliest possible moment.

STACEY MFG. CO.

Deepest Oil Wells in the World Found

During the last few years the Hope Natural Gas Company and the People's Natural Gas Company, both of Pittsburgh, Pa., have been drilling deep wells in northern West Virginia and southwestern Pennsylvania to find deeper oil bearing and gas bearing sands, their object being to reach, if possible, the horizon of the rich Clinton sand of Ohio, which, according to Dr. I. C. White, the State geologist of West Virginia, should be found in this region at depths between 7,000 and 8,000 feet.

The first exceptionally deep well thus drilled, the R. A. Geary well, is about four miles northwest of McDonald, Pa., and about 20 miles southwest of Pittsburgh. The mouth of the well is about 1,050 ft. above sea level. The well penetrates the Gordon stray sand, the last of the usual gas sands in this region, at a depth of 1,971 ft. From this point to a depth of 6,700 ft. the strata penetrated are alternately "lime" and "slate," from 6,700 to the bottom, 7,248 ft., they are "sand" and "lime" interspersed with about 60 ft. of rock salt.

The second deep well was drilled by the Hope Natural Gas Company, on the farm of M. O. Goff, about eight miles northeast of Clarksburg, in northern West Virginia. The well begins 200 ft. below the level of the Pittburgh coal and penetrates the usual oil-bearing and gas-bearing sands, the lowest being the Bayard, which lies at a depth of 2,210 ft. The third deep well is about eight miles southeast of Fairmont, W. Va. The Bayard sand, the lowest of the gas sands, was found in this well at a depth of 2,050 ft.

Named in order of depth, the four deepest wells in the world are the Lake, 7,579 ft.; the Goff, 7,386; a well at Cuzuchow, Germany, 7,348, and the Geary, 7,248. The two deepest wells in the world are therefore the Lake and the Goff, the Lake surpassing the German well by the large margin of 231 ft. In comparison with these great depths, other depths reached by the wells or mines in the crust of the earth are insignificant.

THE ADIRONDACK LIGHT & POWER CORPORATION has announced that a new gas rate will go into effect July 11, raising the price from $1 to $1.50 per 1,000 ft. net, the minimum charge and discount for prompt payment remaining the same.

Massachusetts Utilities Board Recommends Higher Rates for Railroads

The State Department of Public Utilities of Massachusetts has made reply to the request of the Interstate Commerce Commission for its views on the petition of the railroads for an increase in freight rates.

The reply states that it feels "from every point of view that serious consequences will follow from a continued starving of the roads and that the Interstate Commerce Commission should grant the railroads sufficient revenue to enable them to fulfill their functions properly and adequately to serve the public in the manner and to the extent which the common weal demands."

The reply follows:

"The Department of Public Utilities of the Commonwealth of Massachusetts has carefully considered the railroad situation so far as conditions exist within its jurisdiction, and has reached the following conclusions which it respectfully submits for the consideration of your honorable board:

"The integrity of the transportation system is as vital to the welfare of the body politic as the proper functioning of the circulatory system is to the welfare of the body physical. The railroads, owing to a variety of circumstances unnecessary to recite, have reached a condition where they do not and cannot at the present moment serve the vital needs of the country.

"This is a matter of the greatest consequence, not only to the public institutions, utilities and industries of Massachusetts, but to every resident of this commonwealth. This condition must be met in a large and statesmanlike way. The resources of the railroads must be made adequate to meet the emergency.

"The condition of the railroads in Massachusetts, both as to roadbed and rolling stock, is such as to create grave apprehension as to their future safe operation unless they receive sufficient income to enable them to put and maintain their properties in proper order. As illustrations of this, two derailments have occurred recently in Massachusetts owing to the inability of the railroads to secure the means to keep the roadbeds in proper repair. While we do not wish to overemphasize this point or to disturb the public mind unnecessarily, we feel that unless adequate income is allowed the railroads, the public will not only be deprived of the proper facilities which we have pointed out, but will actually run serious risks of life and limb while traveling.

"Any question as to the extent of proposed increases should, we feel, in view of the conditions now obtaining, be resolved in favor of the railroads.

"To give the railroads somewhat less than subsequent experience may demonstrate that they were entitled to will be seriously prejudicial to the interests of the community, while, if what is given them proves in the course of events to have been somewhat higher than was necessary at the time, very little, if any, damage will be done the public, because subsequent adjustments can be made, and, even if they are not made seasonably, income derived in excess of proper current requirements will be largely, if not entirely, needed for depreciation and deferred maintenance. We believe, therefore, that the railroad requirements should be met in a large spirit.

"While the situation should be dealt with, in our opinion, in the way which we have indicated, we venture the suggestion that your honorable board should recognize fully the peculiar situation of New England with respect to transportation, the exceptional difficulties which confront its railroads and the vital need of suitable adjustments in rates and divisions thereof to meet our emergencies and give adequate and appropriate relief accordingly."

Haverhill Gas Light Club Holds Outing

The Haverhill Gas Light Club, Haverhill, Mass., held a twilight party at Canobie Lake Park on June 24. The employees and their families left on special cars at 4.30. A ball game between the office employees, captained by C. R. Roberts, and the works, captained by A. Dubois, resulted in a victory for the office with a score of 5-4. J. W. Murphy and W. Bell were umpires. A basket lunch was enjoyed in the grove and dancing and other attractions added to the afternoon's entertainment. H. C. Edgar, general manager of Stone & Webster, Inc., Boston, attended the affair as the guest of the Haverhill Gas Light Company.

N. Y. Consolidated Stock

The granting of a temporary injunction to the Consolidated Gas Company, New York City, restraining the State, county and public service officials from enforcing the 80-cent gas law and permitting the company to make a temporary charge of $1 in place of the old rate was almost immediately reflected in the market action of the stock. When the news was flashed on the financial ticker service the stock advanced sharply on better buying than it has experienced for some time. The interpretation placed on the action of the Federal court was that the regulating bodies may change their position and be willing to meet the company at least half-way in the matter of its applications for increased rates. Six of the company's subsidiaries participate in the higher rate under the injunction. The Kings County Lighting Company obtained a similar injunction.

Natural Gas Company to Limit Supply to Consumers Next Winter

Not more than 40,000 cu. ft. of natural gas will be allowed any one domestic consumer by the Manufacturers' Light & Heat Company, Pittsburgh, Pa., during the winter months, according to an announcement just made by R. A Quay, of Pittsburgh, general manager of that company. In discussing the ruling which his company proposes to put into effect this fall, Mr. Quay said during a visit to Wheeling, W. Va., that it was a policy adopted strictly as a conservation measure.

The Manufacturers' Light & Heat Company is one of the largest gas service corporations in this part of the country. It supplies many towns in northern West Virginia, southwestern Pennsylvania and eastern Ohio.

Consolidated Gas Output Increases

Boston Consolidated Gas Company, Boston, Mass., reports output for June, 1920, as 504,730,000 cu. ft., an increase of 13.5 per cent over June, 1919. Output for year ending June 30, 1920, was 6,670,656,000 cu. ft., an increase of 7.2 per cent over year ending June 30, 1919.